

What is claimed is:

1. A method of forming a shallow trench isolation structure, comprising:
forming an oxide layer to cover a substrate, wherein the substrate has a first silicon nitride layer formed thereon, and a shallow trench is located in the substrate and the first silicon nitride layer;
performing a wet etching step to etch the oxide layer until the first silicon nitride layer is about exposed;
forming a second silicon nitride layer to cover the oxide layer and the first silicon nitride layer;
forming a photoresist to cover the second silicon nitride layer;
defining the photoresist, and etching a portion of the second silicon nitride layer and the oxide layer; and
removing the photoresist, the second silicon nitride layer, and the first silicon nitride layer.
2. The method according to claim 1, wherein the oxide layer covers the first silicon nitride layer and the shallow trench, and fills the shallow trench in the forming step of the oxide layer.
3. The method according to claim 1, wherein the step of forming the oxide layer is performed by a chemical vapor deposition.
4. The method according to claim 1, wherein the step of defining the shallow trench is performed by a dry etching.

5. The method according to claim 1, wherein the step of etching the portion of the second silicon nitride layer and the oxide layer is performed by a dry etching.

5 6. The method according to claim 1, wherein the step of removing the second silicon nitride layer and the first silicon nitride layer is performed by a clean bench.

7. The method according to claim 6, wherein the clean bench uses a thermal phosphoric acid as a clean solution.

10 8. The method according to claim 1, wherein the oxide layer between the second silicon nitride layer and the first silicon nitride layer is also removed after the second silicon nitride layer and the first silicon nitride layer are removed.

15 9. A method of forming a shallow trench isolation structure, comprising:
forming an oxide layer to cover a substrate, wherein the substrate has a silicon nitride layer formed thereon, and a shallow trench is located in the substrate and the silicon nitride layer;

20 performing a wet etching step to etch the oxide layer until the silicon nitride layer is about exposed;

forming a photoresist to cover the oxide layer;

defining the photoresist, and etching a portion of the oxide layer until the silicon nitride layer is exposed; and

removing the photoresist and the silicon nitride layer.

25 10. The method according to claim 9, wherein the oxide layer covers the

silicon nitride layer and the shallow trench, and fills the shallow trench in the forming step of the oxide layer.

11. The method according to claim 9, wherein the step of forming the oxide
5 layer is performed by a chemical vapor deposition.

12. The method according to claim 9, wherein the step of defining the shallow trench is performed by a dry etching.

13. The method according to claim 9, wherein the step of removing the oxide
10 layer is performed by a dry etching.

14. The method according to claim 9, wherein the step of removing the silicon
nitride layer is performed by a clean bench.

15. The method according to claim 14, wherein the clean bench uses a
thermal phosphoric acid as a clean solution.

16. The method according to claim 9, wherein the oxide layer on the silicon
20 nitride layer is removed after the silicon nitride layer is removed.

17. A method of forming a shallow trench isolation structure, comprising:
providing a substrate, and the substrate has a first silicon nitride layer thereon;
defining a shallow trench on the substrate by a dry etch;
25 forming an oxide layer to cover the first silicon nitride layer and the shallow

trench by a chemical vapor deposition;

performing a wet etch step to etch the oxide layer until the first silicon nitride layer is about exposed;

5 forming a second silicon nitride layer to cover the oxide layer and the first silicon nitride layer;

forming a defined photoresist on the second silicon nitride layer;

etching the second silicon nitride layer and the oxide layer until the first silicon nitride layer is about exposed; and

10 removing the second silicon nitride layer, the oxide layer, and the first silicon nitride layer by a clean bench.

18. The method according to claim 17, wherein the clean bench uses a thermal phosphoric acid as a clean solution.